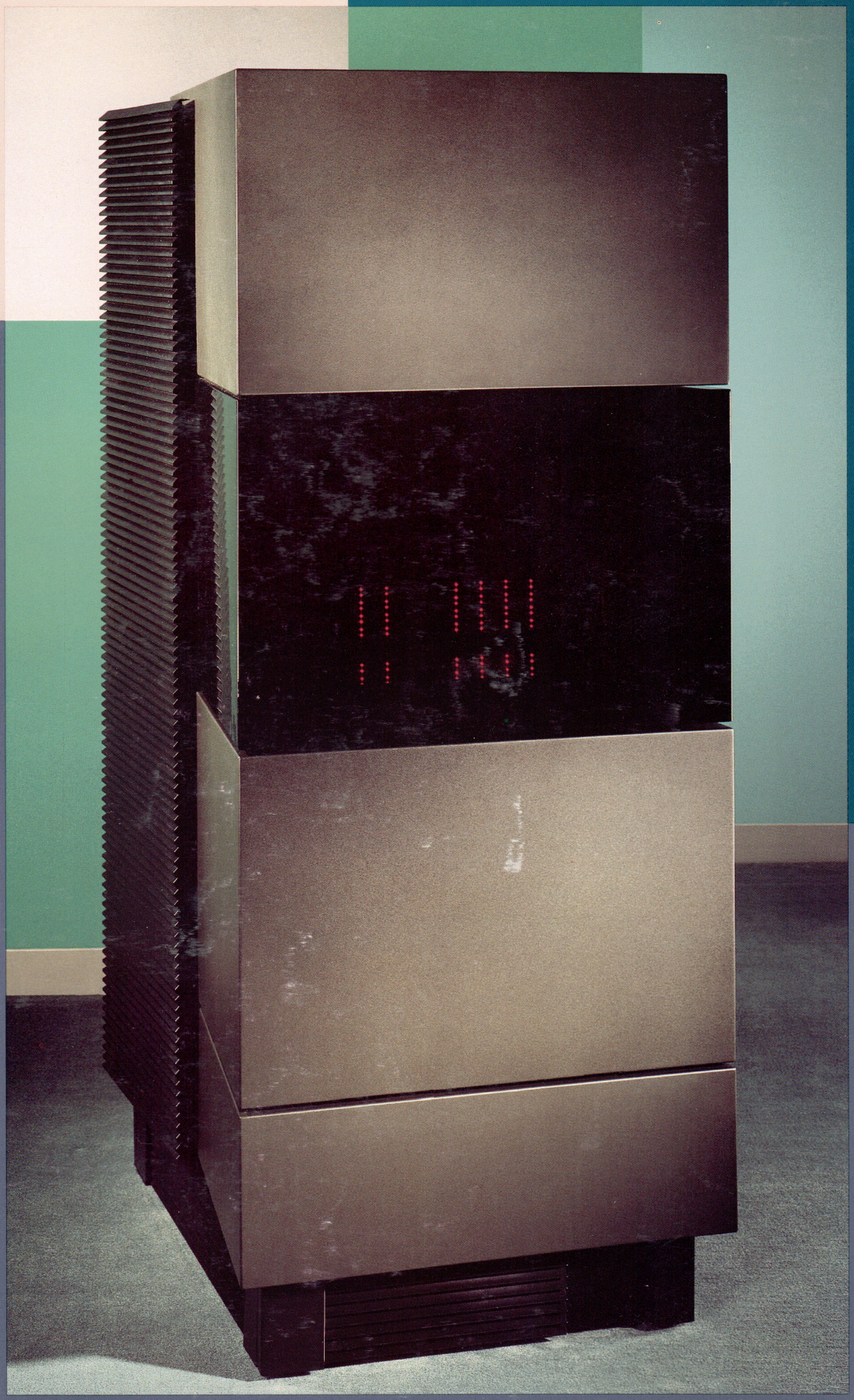
Thinking Machines Corporation

Connection Machine

CM-5

Scale 3



CM-5 Scale 3

CM-5

The CM-5 Scale 3 is a 4 Gflops supercomputer designed primarily for principal investigators and for small university and industry-based research teams. As a specially configured 16- or 32-PN CM-5 system, the Scale 3 provides the same functionality, and runs the same suite of software, as larger CM-5 configurations—at a substantially lower cost.

Each Scale 3 processing node is a 128 Mflops computational unit composed of a SPARC microprocessor, 4 vector units, 32 Mbytes of memory and a network interface. Applications developed on a Series 3 system can run unchanged on larger CM-5 configurations.

As with all CM-5s, processor nodes and I/O modules on the Scale 3 are interconnected by the industry's only truly scalable and redundant networks. The Data Network handles high-bandwidth, point-to-point data transfers; its performance is optimized for applications with complex, irregular, and dynamic data structures. The Control Network handles coordinated interactions that involve many processors (e.g., broadcasting and synchronization). The Diagnostic Network provides, under supervisor control, privileged access to all system components.

A Scale 3 system is typically configured with a Scalable Disk Array (SDA) comprised of one to three disk storage nodes. Each node, which includes a controller and eight 3.5" drives, has 9.2 Gbytes of storage capacity and a transfer rate of 12 Mbytes/sec. A fully configured Scale 3 SDA has a 25 Gbyte storage capacity and a 33 Mbyte/sec transfer rate. A highly efficient data protection scheme guards against both media- and transfer-induced data loss, using only a single redundant drive.

The Scale 3 uses CMOST (Connection Machine Operating System), an enhanced version of UNIX, which is optimized to support parallel computation, communication, and I/O. CMOST provides a complete range of functionality, including timesharing, batch processing, NFS, NQS, and UNIX protection. CMOST also includes the Scalable File System (SFS) which supports the SDA.

Each Scale 3 system comes with one internally mounted, SPARC 2 Control Processor. Control Processors manage partitions of processor nodes, provide system administration services, perform I/O control for the file system, and (optionally) provide connections to FDDI.

CM-5 Scale 3 Configurations

32-PN System

- 4 Gflops/4 Gops peak
- 1 Gbyte memory
- 16 Gbytes, 22.5 Mbytes/sec RAID-3 SDAs consisting of 2 disk storage nodes
- May be partitioned into two 16-PN partitions

16-PN System

- 2 Gflops/2 Gops peak
- 512 Mbytes memory
- 8 Gbytes, 10.5 Mbytes/sec RAID-3 SDA consisting of 1 disk storage node

Scale 3 System Features

- Complete support for Data Parallel (global) and Message-Passing programming styles
- Internally mounted SPARC 2 Control Processor with 64 Mbytes of memory and 848 Mbytes of disk storage
- Internally mounted storage package includes 1.2 Gbyte hard disk, QIC 150 cartridge tape, 8 mm EXABYTE cartridge tape, and CDROM
- PRISM—Integrated, Motif-based graphical programming environment for developing, executing, debugging, and performance tuning application code and for data visualization
- CMAX—A tool developed by Applied Parallel Research which aids in the conversion of Fortran 77 programs to CM Fortran
- CMOST (Connection Machine Operating System) license
- Software licenses for:

CM Fortran	Data Parallel Fortran
C*	Data Parallel C
CMSSL	Scientific Software Library
CMMD	Message Passing Library
CMX11	X Windows-based Graphics Package
CM/AVS	AVS-based Distributed Visualization System

- 3 years hardware maintenance and software support
- 5 credits for training classes
- Expansion options include SDA (up to 25 Gbytes), Integrated Tape System (ITS) and FDDI

Scale 3 System Summary

	16-PN Configuration	32-PN Configuration
Processing Nodes	16	32
Network Addresses	64	64
Performance		
Peak floating-point (Gflops)	2	4
Peak integer (Gops)	2	4
Memory capacity (Gbytes)	.5	1
Memory bandwidth (512 Mbytes/sec per node) Aggregate (Gbytes/sec)	8	16
Interprocessor communications bisection bandwidth (Mbytes/sec)[1]	80	160

[1] Bisection bandwidth for random communications, all nodes active

Physical Dimensions

CM-5 Scale 3 Cabinet	
Height, in. (cm)	69.5 (177)
Width, in. (cm)	29 (74)
Depth, in. (cm)	37 (94)
Weight, lb. (kg)	600 (276)

Power Characteristics

Primary Power	
CM-5 Scale 3 cabinet	3 wire, single phase, 208 VAC, 50/60 Hz, 50A service
System console	3 wire, single phase, 115 VAC, 50/60 Hz, 15A service
CM-5 Scale 3 power cord	9-foot cord terminated with IEC Type 309 plug; mates with:
Wall receptacle	Hubbell 360R6W
Cable connector	Hubbell 360C6W
Power	5.9 KVA
Power dissipation	
Maximum	4900W, 16,700 BTU/hour
Typical	3900W, 13,300 BTU/hour

Environmental Specifications

Recommended Ambient Air Temperature (at louvered panel inlet)	73° F (23° C)
Maximum Ambient Air Temperature	
Sea level to 5000 ft (1500 m)	82° F (28° C)
Above 5000 ft (1500 m)	Reduce by 1°F/1000 ft (1° C/500 m)
Relative Humidity, Non-Condensing	20% - 80%, maximum wet bulb 77° F (25° C)

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